

Defining a specific need or problem: The Navajo Nation is the largest Native American Tribe in the United States that extends over a vast three state geographical area. The extreme remoteness of the region, severe economic constraints and many other existing disparities have severely hampered efforts to promote community networking and effectively provide much needed public services. The lack of modern telecommunications and information infrastructure on the Navajo Nation is a fundamental stumbling block inhibiting significant progress in these areas.

The Navajo Nation's Western Agency and its 18 targeting chapters (local government entities) of the Navajo Technology Empowerment Center (NAVTEC) project are distributed over a 5,559,620.80 acre region which is part of a Federal Enterprise Zone. Severe social, ecological, health and economic problems have plagued the 35,242 residents of the area for many years. Business development efforts have repeatedly failed, chronic health problems such as diabetes are on the rise, youth gang participation is increasing, care for the elderly and child protection are continuing problems. Unemployment is chronic, reaching levels of 58%. Per capita income averages \$4,106 and over 56% of the people live below the poverty level. Thirty percent of adults have a less than ninth grade education. The average distance to reach limited post-secondary training is 127 miles. There are no cable television services, no local radio station, no local television stations and extremely limited cellular telephones services. The ratio of people to residential phone numbers is 49:1. There is no public library, no public transportation, and only 2 emergency dirt airstrips. Absent also is the Internet. (See "Reducing Disparities" section for additional need-related data.)

A possible solution to these problems and also a complicating factor is the new Local Governance Act passed by the Navajo Nation Council in 1998 which has transferred substantial governing authority to local chapters without providing the technical means. A variety of administrative functions including accounting, payroll, property management, day-to-day direction of chapter services and communications are now required for the chapter staff and their leadership. Without a sharing of information resources and community networking to solve local problems, the chapters cannot hope to manage their new responsibilities. Due to the distances to public service providers under the Indian Health Service and the Navajo Nation Government divisions, often up to 300 miles, it is frequently impossible for central government services and information resources to be accessed by citizens. The conducting of Navajo Nation general elections has been particularly problematic with last minute ballot changes and vote counting discrepancies causing invalidation and political conflict.

Internet access can be a solution to information access but under existing conditions is prohibitively expensive. Some tribal institutions on the western side in the Navajo Nation's second-largest city – paid \$17,400 per year for a single 56-kbps data line to an Internet access point. Institutions have waited two years for the installation of additional service. The telecommunications infrastructure, especially as it pertains to small and isolated institutions and agencies (including the Bureau of Indian Affairs and Indian Health Services) provide for their own future connectivity through extraordinary measures. The problem is the separation and isolation of people who have meager financial resources and live in a nation-state of the same condition. By banding together and linking their existing "Virtual Alliance" satellite IT systems with the resources of

Western Navajo Agency, this collection of chapter houses, seeks to open the communications flow and set an example – by looking skyward and reaching electronically into new and existing e-services located at great distances but made available at the speed of light.

Proposing a credible solution that employs network technologies: The Navajo Nation Division of Community Services (NNDCD) will create a flagship Navajo Technology Empowerment Center (NAVTEC), a secure Internet-based e-commerce, e-training and data collection hub for Western Navajo Agency and its eighteen remote Chapter houses. This multi-purpose self-contained center will offer the community a variety of IT-based services: business and skills education – business management, IT training and certification, English as a Second Language, industry specific training, special classes, seminars and guest lectures; job enrichment, training and posting; ‘e-jobs’, i.e., new web-enabled community employment; community IT support - dependable Internet access, business services (onsite and e-based), e-commerce enabling (website development and hosting), business registry services. Based on the LINCOS model (Little Intelligent Communities), tested in developing nations around the globe, the NAVTEC will provide a stable comprehensive IT platform suited to the demanding environmental conditions of the Navajo Nation.

The NAVTEC will support a twenty-four workstation classroom and business center at its Western Navajo Agency location. It will be connected to available T1 line service providing broadband Internet access. Through the existing 110 Chapter Navajo Nation Virtual Alliance Starband satellite wide area network, the NAVTEC will be connected to all eighteen Chapters (local townships) in Western Navajo. These Chapters will have IT access to all of the above e-based solutions. Chapter officials will receive hands-on training at NAVTEC to insure effective utilization of available services. The NAVTEC will serve as a community data distribution and collection point to allow interactive information sharing. Electronic voting at the Chapters and e-ballot preparation through NAVTEC will inaugurate an efficient democratic election system. Teleconferencing facilities at NAVTEC will facilitate much needed community networking between the allied Chapters and contributing global partners.

Identifying realistic, measurable outcomes that you expect to result from carrying out the project: The Navajo Nation and its people will experience a significant improvement in their lives through the NAVTEC project. It is expected that at a minimum, five thousand community members (20%) of the Agency and its eighteen Chapters will regularly use the NAVTEC facilities and for the first time be able to copy, scan, transmit data, receive instant medical alerts, participate in culturally relevant teleconferences, conduct e-commerce (create catalogues, register businesses, create business web pages), receive end-user training (desk top computing, home and small business, business skills development), receive technical IT and web development training, receive industry specific training including financial/banking and health care, participate in needed English as a Second Language and literacy skills courses, enroll in university degree and certificate programs (e-commerce, global enterprise management, entrepreneurship, IT management, project management, conflict management, health care). These training and coursework offerings will be provided at minimal cost ranging from \$40-\$150 for an entire series of courses through the World e-Inclusion program. With convenient local

access to a wide area network in communities, it is expected that at least 50% of the participating trainees and students will successfully complete a full series of instruction. This compares very favorably with the 10% documented retention rate for Native Americans at post-secondary institutions across the country.

Job search enhancement through NAVTEC will be utilized by the 58% unemployed Navajo community members. Currently, the Navajo Nation Division of Employment and Training serves its clients through paper-based assistance limited to its five Agency centers. Through the wide area network, the eighteen participating Chapters will receive: e-job support – web-enabled job creation made possible through training and access, and contracted with global and local employers; job postings, job search references and tools (targeted for the public); e-staffing support – resume database, recruiting tools and techniques (targeted at employers). Through NAVTEC access and job search assistance we are reasonably sure that a minimum of 10-15% of eligible unemployed Navajos will secure some degree of employment with local or regional employers.

All 15,478 registered voters in Western Navajo Agency will enjoy the benefits of NAVTEC mediated e-voting in Navajo Nation general and local elections. Electronic ballots, prepared in cooperation with the Navajo Nation Board of Elections, will be available in a timely manner and easily accessed at each of the eighteen Chapters. Voter registration, voting, vote tabulation and transmittal will be handled through the NAVTEC secure wide area network. It is expected that the four remaining Navajo Agencies will also adopt this e-voting strategy utilizing their future NAVTEC facilities.

Targeting Underserved Communities: Occupying an area of 5,559,620 acres adjacent to the Grand Canyon, Western Navajo Agency's eighteen Chapters exhibit most of the symptoms of economic and social hardship endemic in the Navajo Nation. Available total employment opportunities in each Chapter average 8-10 positions, largely with Navajo Nation government offices. Chapters in which schools are located will have a small number of school operations positions available, but these are often occupied by non-Indian teaching staff. The average Chapter population is 1,000-2,000, with the largest, Tuba City, having 8,000 residents. It is clear that these miniscule employment opportunities provide no assurance of community well-being and lead to associated social problems.

Violence among Native Americans is the highest among all ethnic groups in the U.S. today. Gang membership is prevalent among Navajo youth and results largely from a lack of productive opportunities in addition to a lack of communication with creative active peers and role models elsewhere in the U.S. Divorce is rising and problems stemming from single parent families are leading to the creation of juvenile detention centers across the Navajo Nation. The following results from the 2000 Navajo Nation High School Youth Risk Behavior Survey point out the disturbing levels anti-social and self-injury behavior: carried a weapon in the last month – 21%, were in a physical fight during the past year – 38%, attempted suicide during last year – 16%, seriously considered suicide during the past year – 20%, rode with a drinking driver during past month – 39%, drank alcohol during past month – 43%, used marijuana during past month – 39%, ever used cocaine – 16%, ever inhaled or sniffed glue or paint – 14%. A recent

study by Shiprock Chapter indicates that Navajo children watch an average of 3 to 5 hours of television per day.

These patterns are typical in a population where economic and social mobility are severely constrained. The per capita income in Western Navajo Agency of \$4,106 with 56% of the population living in poverty is a commentary on the economic hardship suffered by its people.

Innovation: The NAVTEC project ushers in a dramatically new approach to solving technology infrastructure access problems in Indian country. Building on the proven self-contained e-commerce and education systems used in developing nations under the Hewlett Packard World eInclusion initiative, the NAVTEC brings an innovative additional wide area network resource into the model. The currently operating Starband satellite Chapter Internet network in itself represents an enormous innovation for rural IT delivery and its linkage to a sophisticated world-class e-service provider (NAVTEC) will create powerful information sharing synergy. For those eighteen Chapters who have been disillusioned by the historic recognition that “you can’t get there from here”, this project represents a viable and exciting means to immediately enter the global e-commerce and e-education environment. A culturally sensitive wide array of e-services, available in an aggregated format through a Navajo controlled Agency will be a unique phenomenon for the Navajo Nation and very likely throughout Indian country.

Electronic ballots and e-voting have been in the news recently as a result of problems with the U.S. elections process. Building on the lessons learned by companies such as Votation.com in conducting legally binding elections for the Arizona Democratic Party and other non-profits, credit unions, and pension funds, the pilot NAVTEC mediated Navajo Nation electronic elections will represent a major departure and innovation from standard practice. With the eventual addition of the four remaining Agency NAVTEC facilities, the Navajo Nation will be the first nation in the world to conduct all of its election activities in an e-environment. The lessons learned will be of substantial interest to other small nations and civic administrative bodies.

Online business staffing and individual employment searches may seem prosaic in a typical IT environment. On a remote wide area network in the Navajo Nation, however, this e-service represents a significant and innovative stride. Building on proven web-enabled job creation and job search, resume base, job reference models used by Hewlett Packard’s World eInclusion initiative in Third World countries around the globe, NAVTEC will be piloting an innovation which can be replicated in more rural areas throughout the U.S. Hewlett Packard, itself, has recognized this need through its newly created Village Centers program now being piloted in Colorado and Kansas.

Diffusion: We are confident that the Navajo Technology Empowerment Center will provide the necessary infrastructure and training to effectively address our defined problems and also serve as a national model for various Native American tribes and other rural, isolated communities. This Center will assist our Navajo people and serve as a national model in countless ways including: providing secure interactive community/municipal data collection and distribution through wide area networked systems linked to aggregated e-service centers in extremely rural areas; operating e-

election systems over secure rural broadband satellite wide-area networks; providing comprehensive aggregated e-commerce and local business services to rural Native American populations and providing access portals to a wide area network (all of the e-commerce information will be available to the existing 110 Chapter Virtual Alliance network as well); providing substantive career-oriented online certificate and degree education and training programs. Due to the self-contained nature of NAVTEC, its systematic approach to providing aggregated e-services, and new inexpensive Starband type satellite IT networking, it will be easily possible to replicate this project in rural areas. To date, the existing Navajo Nation Virtual Alliance project has been featured in articles in the New York Times and Washington Post newspapers as well as the Digital Divide eMagazine.

The projected diffusion mechanisms for the NAVTEC project will be: web sites generated for local entrepreneurs and businesses; community data bases; Navajo Nation Chapter presentations; video teleconferences; Chapter newsletters; Navajo Times newspaper, Arizona Republic newspaper; Indian World Today newspaper; virtual trade show presentations; U.S. Department of Interior, Bureau of Indian Affairs publications; generating a NAVTEC web site which will provide calendars, commentaries and updates on problems and solutions; *posting* information on the existing Southwest Navajo Nation Virtual Alliance website; contributing to learning technology, global telecommunications, rural business development and Native American business leadership conferences and publications; establishing a positive presence with the American Indian Business Leaders Association in their activities.

Since NAVTEC will have the capability of hosting video teleconferencing events, we expect to work with Hewlett Packard and Teltecglobel (the distributor of international World eInclusion Centers) to enter into dialogues with a variety of partners in developing nations around the world. Since the overseas centers operating systems will be compatible with NAVTEC, it will be possible to share information and adopt “best of breed practices” from one another rapidly and efficiently. In addition, with NAVTEC’s relationship with Hewlett Packard’s domestic Village Center program, we will have access to all of the media exposure this initiative entails.

Project Feasibility: Technical Approach – The NAVTEC system relies on proven and available T1 technology for basic IT connections. Citizens Telecom, the service provider on the Navajo Nation, has established service to the Western Navajo Agency area. The LINCOS unit which will be installed to provide IT and e-commerce platforms is structured around specific domain servers, connection server, e-mail server, and WWW server. The wireless connection system, classroom workstation/support equipment system, web design workstation, travel tourism workstation, executive recruitment workstation, administration workstation, business center workstation and A-V center are all configured on a Microsoft Office Pro/MS NT 2000 operating system. Specialized commercially available software to support each of these specific functions is also included in the technology plan.

Communication of coursework and associated e-commerce, employment and e-voting functions at the partner Chapter houses will be facilitated by local servers connected to the five workstation units currently housed at these eighteen locations. The

Bill and Melinda Gates Foundation, which donated these workstations, is providing training and maintenance support for these systems. The current Starband satellite IT connection operating at 400 kb/s at all 110 Navajo Chapter houses will provide connectivity to the NAVTEC T1 pipeline operating at 1.54 mb/s. All systems of the NAVTEC and wide area network stations are completing interoperable and mutually support transmission and data loads. We have used standard commercial systems to insure ease of maintenance, expansion potential and replacement if necessary. This interoperability factor is also important for the intended replication of the NAVTEC at four other Agency sites so that maintenance functions are uniform across the system. We feel that the volume of use on the NAVTEC at the Agency will probably not exceed its capacity for some time. We do foresee expansion of the classroom workstations to allow for greater student enrollment. It is also likely that the five workstations at each Chapter will also be increased to accommodate greater Chapter member participation.

Since much of the data transmitted through the NAVTEC system will be extremely sensitive to confidentiality, there will be extensive firewall and encryption applications both at the Agency center and at the Chapter houses. We will utilize the state-of-the-art electronic privacy systems to insure that all voting information, employment characteristics, and e-business transactions are protected.

Applicant Qualifications – All equipment delivery and installation and online coursework will be provided by a successful bidder. The turnkey product will provide the necessary technology infrastructure for providing electronic service delivery. Technical direction and support will come from the Division of Community Development's Information Management Team.

Expert project review will be provided by Dr. Paul Resta, Direct, Learning Technology Center of the University of Texas. Oversight authority from the Transportation and Community Development Committee of the Navajo Nation Council exists and will provide general oversight for NAVTEC operations. The Division of Community Development Director will also provide oversight and direction for NAVTEC.

Budget, Implementation Schedule, and Timeline – The Project Coordinator will provide the overall project management. Fiscal management will be provided by the Navajo Division of Finance and the Division of Community Development Administration. The budget is balanced for a 50/50 federal and matching fund split and there is a heavy emphasis on equipment and infrastructure. The emphasis for the budget is to provide a solid technology resource to maximize end-user benefits. Please see attached budget narrative and timeline for specific budget and schedule information.

Sustainability: The NAVTEC project is assured of long term sustainability due to several factors: 1) The Navajo Nation Division of Community Development has a long term commitment and experience in maintaining and operating LAN and WAN networks at different locations across the Navajo Nation. It has maintained a stable technical staff during this period. 2) Western Navajo Agency is a Navajo Nation government entity guaranteed to exist into the future. 3) The Navajo Nation Virtual Alliance is tied to Chapter budgets and will continue to provide WAN services into the future. 4) The

NAVTEC center will be completely self-supporting at the completion of the grant period through a scheduled and fully cost analyzed fee structure which will be applied to all e-services supplied by the center. This fee structure is designed to provide services at cost to Navajo clients and will allow the NAVTEC to continue operating into the future.

Community Involvement: The University of Texas Learning Technology Center, Texas A & M University, Institute for Native Americans – Northern Arizona University, Dine College, U.S. Indian Health Service, Teltecglobal, Hewlett Packard Village Centers/World eInclusion, the eighteen Chapters of Western Navajo Agency, Western Navajo Agency, and the Navajo Nation Divisions of – Human Resources, Social Services, General Services, Economic Development, Dine Education, Public Safety, Natural Resources, Navajo Nation Data Resource Center, Navajo Nation Temporary Aid to Needy Families, Office of the President of the Navajo Nation. These local and national partner institutions each have specific expertise and resources to enhance and develop the e-service offerings through the NAVTEC and its associated wide area network. The Navajo Nation Division of Community Development continually polls the Navajo people through its Chapter administrations as to their wishes and needs regarding telecommunications services. In addition, the various Divisions have also expressed their needs during extensive tribal conferences and meetings dealing with telecommunications infrastructure requirements.

Obtaining and Sustaining Community Involvement - The Navajo Nation President, Kelsey Begaye, made technology a high priority during his present administration. He has incorporated this vision into one of his strategic directions entitled, “Integrating Technology for the Future”. The 110 Navajo Nation Chapter communities existing as local governing units of the Navajo Nation government, has since been supported with new innovative technology through a local partnership with Southwest Navajo Nation Virtual Alliance and nationally, with the Bill and Melinda Gates Foundation. Today, all Chapters have up-graded equipment both in hardware and software, and an innovative method of accessing the Internet via the satellite. For the first time in Navajo history, since the integration of technology, has there been such a pervasive impact across the 26,000 square miles of the Navajo Nation. Currently, each community communicates via the e-mail that has begun to transform the spatial challenges and shifted the paradigm for new solutions where economic and business development is a priority.

Support for End-Users-Currently, the community members travel on the average of twelve miles round-trip to Chapters and then another three hundred miles, for direct services, to the central Navajo Nation offices in Window Rock, Arizona. In the Navajo Nation capital, intensive efforts are underway to consolidate existing fragmented community-relevant information and to standardize technology-related efforts. Geographic and demographic databases once established will contain information about individual requests, such as, for a business site lease including status on business loan assistance, or even status on economic infrastructure projects. So, when an individual inquires locally about routine questions concerning opportunities or projects status, using the satellite Internet to access the regional technology centers, the response time is efficiently enhanced. Thereby, the services are provided in a virtual environment in a less costly manner for the client and the local Chapter officials.

Evaluation: The focus of this project is to initiate and support personal and community empowerment through the provision of specific resources. For that reason, the evaluation will have both qualitative and quantitative aspects. The evaluation will be objectives-driven, with data collection and analysis specified for each item; however, unintended outcomes that emerge during the project will also be recorded and analyzed. A key feature of this evaluation process relies on data collected automatically by NAVTEC servers on client use of e-services. This data will provide formative and summative indicators of project achievement and suggest redistribution of resources if necessary. The evaluation report will have three sub-reports: baseline data and analysis, mid-project data and analysis, and end-of project data and analysis. All data and analyses will be reviewed by both the University of Texas and the Texas A&M University evaluators to provide peer review and multiple perspectives. A table of objectives, data sources, and methods of analysis follows (Table *)

Table *. Target Information, Data Sources, and Methods of Analysis

Objective 1: Initiate modernization of the Navajo Nation through the establishment of a state-of-the-art e-commerce, training and data collection hub		
TARGET INFORMATION	DATA SOURCE(S)	METHOD OF ANALYSIS
Infrastructure on reservation	<ul style="list-style-type: none"> * Agency and school reports * Interviews with agency and school administrators 	Quan: Preparation of technology profile - number and kind of resource Qual: Interview response patterns
Extant e-commerce on reservation	<ul style="list-style-type: none"> * Agency and school reports * Interviews with agency, school, and local business administrators • Internet search • NAVTEC online usage data 	Quan: Preparation of technology profile - number and kind of business Qual: Interview response patterns
Extant training opportunities in geographic area	<ul style="list-style-type: none"> * Review of area publications * Interviews with agency, school, business and Tribal Division administrators * Training reports 	Quan: Preparation of technology profile - number and kind of opportunities; geographic & other potential barriers Qual: Interview response patterns
Current level of technological expertise among population	<ul style="list-style-type: none"> * Mail-out surveys 	Quan: Preparation of technology profile - kinds and levels of skills
Self-identified technology needs of population	<ul style="list-style-type: none"> * Mail-out surveys * Stratified random interviews 	Quan: Preparation of technology profile - kinds and levels of skills needed, purposes Qual: Interview response patterns
Objective 2: Facilitate democratic principles within the Navajo nation through the establishment of an electronic voting system		
Description of voting process	<ul style="list-style-type: none"> * Stratified random interviews and Navajo Board of Elections hearings transcriptions 	Qual: Interview response patterns
Perceived effectiveness of voting process		
Involvement in voting process	<ul style="list-style-type: none"> • Voting records of Navajo Nation • NAVTEC online usage data 	Quan: Voter turn-out
Objective 3: Reduce unemployment on the Navajo Nation by providing online job banks, CV production and distribution, and job placement services		
Distribution of information on job availability	<ul style="list-style-type: none"> • Navajo Nation Division of Employment and Training Agency client interviews • NAVTEC online usage data 	Quan: Establish contact patterns
Quantity, effectiveness and accessibility of specified economic resources	<ul style="list-style-type: none"> * Demographic reports • Stratified random interviews • NAVTEC online usage data 	Quan: Preparation of employment pattern profile - number and kind of opportunities Quan: Number of Navajos benefiting from resources Qual: Interview response patterns
Objective 4: Improve educational offerings on the Navajo Reservation by providing the infrastructure and training necessary for technology-rich instruction		
Quantity and quality of training opportunities for Navajo citizens	<ul style="list-style-type: none"> • Vocational school Training reports • Records of Navajo Nation Division of Employment and Training 	Quan: Preparation of training (technology-based) profile - number and kind of opportunities
Demographics of participation in training opportunities by Navajo citizens	<ul style="list-style-type: none"> * Demographic reports • Stratified random interviews • NAVTEC online usage data 	Quan: Preparation of technology profile - number and kind of opportunities Quan: Number of Navajos benefiting from resources Qual: Interview response patterns
Accessibility to career, certificate based training	<ul style="list-style-type: none"> • Education completion surveys • Certificate awards 	Quan: Survey analysis Qual: Client Anecdotal Report

